RR

Calendar No. 1043

82D CONGRESS, 2d Session } SENATE { REPORT No. 1106

PROVIDING FOR RESEARCH INTO AND DEMONSTRATION OF PRACTICAL MEANS FOR THE ECONOMICAL PRODUCTION FROM SEA OR OTHER SALINE WATERS, OR FROM THE ATMOSPHERE (INCLUDING CLOUD FORMATIONS), OF WATER SUITABLE FOR AGRICULTURAL, INDUSTRIAL, MUNICIPAL, AND OTHER BENEFICIAL CONSUMPTIVE USES

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Mr. O'MAHONEY, from the Committee on Interior and Insular Affairs, submitted the following

REPORT

[To accompany S. 5]

The Committee on Interior and Insular Affairs, to whom was referred the bill (S. 5) to provide for research into and demonstration of practical means for the economical production, from sea or other saline waters, or from the atmosphere (including cloud formations), of water suitable for agricultural, industrial, municipal, and other beneficial consumptive uses, and for other purposes, having considered the same, report favorably thereon with the following amendment in the nature of a substitute:

That in view of the acute shortage of water in the arid areas of the Nation and elsewhere and the excessive use of underground waters throughout the Nation, it is the policy of the Congress to provide for the development of economically feasible means of producing from sea water, or from other saline waters, water of a quality suitable for agricultural, industrial, municipal, and other beneficial consumptive uses. To this end, the Secretary of the Interior, acting through such agencies of the Department of the Interior as he may deem appropriate, is authorized to construct, maintain, and operate facilities (including not more than one demonstration plant) to determine and to demonstrate the feasibility of producing water as aforesaid and for purifying, storing, and distributing the water and by-products derived from the operation of such facilities. Facilities constructed and operations undertaken pursuant to this Act shall be on a scale sufficient to determine the feasibility of the development of such production and distribution, on a large-scale basis, for the purpose of conserving and increasing the water resources of the Nation.

SEC. 2. In order to carry out the purposes of this Act, the Secretary of the Interior is authorized—

(a) to conduct research and development work, and with the demonstration plant and other facilities to make careful engineering studies to ascertain the lowest investment and operating costs, and to determine the best plant designs and conditions of operation;

(b) to study methods for the recovery and marketing of byproducts resulting from and incident to the production of water as herein provided for the purpose of ascertaining the possibilities of offsetting the costs of water production in any area by the commercial utilization of such products;

(c) to acquire by purchase, license, lease, or donation, secret processes, technical data, inventions, patent applications, patents, licenses, land and any interest in land (including water rights, easements, and leasehold interests), plants and facilities, and other property or rights: *Provided*, That the land or other property acquired hereunder shall not exceed that necessary to carry on the experiments and demonstrations for the purposes herein provided;

(d) to engage, by contract or otherwise, chemists, physicists, engineers, and such other personnel as may be deemed necessary, and any educational institution, scientific organization, or industrial or engineering firm deemed suitable to do any part of the research or other work; and

(e) to cooperate with any other Federal, State, or municipal department, agency, or instrumentality, and with any private person, firm, educational institution, or other organization in effectuating the purpose of this Act.

SEC. 3. Research undertaken by the Secretary of the Interior under the authority contained in this Act shall be coordinated or conducted jointly with the Department of Defense to the greatest practicable extent compatible with military and security limitations, to the end that research and developments under this Act which are primarily of a civil nature will contribute to the defense of the Nation and that research and developments in the same field which are primarily of a military nature and are conducted by the Department of Defense will be made available to advance the purposes of this Act and to strengthen the civil economy of the Nation.

SEC. 4. The Secretary of the Interior is authorized, for the sole purpose of this Act, to dispose of all water and other products produced as a result of his operations under this Act pursuant to regulations to be prescribed by him: *Provided* That nothing in this Act shall be construed to alter existing law with respect to the ownership and control of water.

SEC. 5. All moneys received for products of the plants under this Act shall be paid into the Treasury as miscellaneous receipts.

SEC. 6. The Secretary of the Interior shall make reports to the President and the Congress at the beginning of each regular session of the action taken or instituted by him under the provisions of this Act. The report shall include suitable recommendations for further legislation.

SEC. 7. The Secretary of the Interior may issue rules and regulations to effectuate the purposes of this Act.

SEC. 8. There are authorized to be appropriated, from any funds in the Treasury not otherwise appropriated, such sums, not to exceed $2,000,000, as the Congress may from time to time deem necessary to carry out the provisions of this Act.

Amend the title so as to read:

A bill to provide for research into and demonstration of practical means for the economical production, from sea or other saline waters, of water suitable for agricultural, industrial, municipal, and other beneficial consumptive uses, and for other purposes.

The committee recommends that the bill, as amended, do pass.

PURPOSE AND HISTORY OF THE BILL

When this proposal was originally made by the introduction of S. 1300 in the Eighty-first Congress, first session, it was designed solely to provide for research into the possibilities of the transformation of salt water into fresh water at a cost which would make possible its use. The bill also authorized the construction of a single demonstration plant to determine the feasibility of using the methods developed by research.

Later, that bill was amended to include authority for weather control; that is to say, the stimulation of precipitation from clouds by scientific means. When S. 5 was introduced it included both systems.

Hearings were held jointly by subcommittees of the Interior and Insular Affairs Committee, the Interstate and Foreign Commerce Committee, and the Agriculture and Forestry Committee on March 14, 15, 16, 19, and April 5, 1951, during the first session of the Eighty-second Congress.

As the result of these hearings, it was the judgment of all concerned that the two methods should be separated. A new bill for weather control (S. 2225) has been introduced and referred to the Committee on Interstate and Foreign Commerce, which has jurisdiction over matters affecting the Weather Bureau.

S. 5, therefore, has been amended by this committee to eliminate all reference to weather control and artificially induced precipitation. It has also been amended to strike out language in the original bill which might have been interpreted to grant the Secretary of the Interior unnecessarily broad powers, as, for example, over the granting of licenses under patents. It has also been amended to reduce the appropriation authority from $25,000,000, as was first tentatively proposed, to $2,000,000.

It is the opinion of the committee that this sum will be sufficient to allow a practical research and demonstration program to be worked out, particularly, since the bill provides that the research undertaken by the Secretary "shall be coordinated or conducted jointly with the Department of Defense to the greatest practicable extent compatible with military and security limitations."

The bill also authorizes the Secretary "to cooperate with any other Federal, State, or municipal department, agency, or instrumentality, and with any private person, firm, educational institution, or other organization" interested in pursuing the purposes of the bill.

It was reported to the committee that private agencies are available to cooperate financially in advancing the study. That such research should be authorized has been persuasively urged upon the committee by testimony which points out the growing need for water throughout the United States.

CRITICAL WATER SHORTAGE

Expanding industry is using more and more water. This is true with respect to new industry and with respect to the expansion of old industries. Industrial growth causes water shortages. Industrial coastal cities requiring water for industrial and domestic purposes will be more and more dependent upon the success of this operation.

It has been pointed out as particularly important in the case of communities like Los Angeles and San Diego, in California, where the supply of fresh water for municipal purposes has been a constant and growing problem, and may in fact limit future municipal and industrial growth.

GREAT INDUSTRIAL DEMANDS

The consumption of water by industry is far greater than is generally understood. The magnitude of modern need for and use of water is illustrated by a fact reported at the hearings, that the Baton Rouge oil refinery in Louisiana uses more water than the entire city of Cleveland, Ohio, although it is only one plant. The Bay Refinery in New York uses more water than the city of Buffalo, N. Y. The committee was

told that in such plants water is pumped through the cooling towers at the rate of approximately 260,000,000 gallons per day.

Not less than 30,000 gallons of water are required to make a ton of newsprint, some 60,000 to 120,000 gallons to make steam from a ton of coal. For every thousand pounds of cotton used to produce mercerized cotton 30,000 gallons of water are consumed. Even the basic operation of sizing cotton requires 820 gallons for a thousand pounds. It takes 70,000 gallons to finish a thousand pounds of woolen fabrics, and 77,000 gallons of water to refine 100,000 barrels of oil. It takes 500 gallons of water to manufacture a ton of soap, and one-half gallon to make a pound of sugar.

As the canning industry grows the use of water apparently grows. Seven thousand gallons are required to process 100 cases of No. 2 cans of tomatoes, 12,500 gallons for the same amount of succotash, and 25,000 gallons for the same amount of lima beans.

In every field of industry—production of electrical energy, the testing of airplane engines, the manufacture of aviation gasoline, the manufacture of aluminum, the processing of iron ore, the manufacture of explosives, the operation of slaughterhouses—more and more water is required.

OTHER PRESSING SHORTAGES

Many States are finding it necessary to pass legislation to limit the drilling of water wells. The need of additional water to solve the problems of the arid West has long been known. Indeed, acute water shortages have developed in many areas of the West and there is every reason to believe that if fresh water can be economically made from salt water both agriculture and industry will benefit to the great economic advantage of the whole country.

Domestic and municipal uses are also increasing. An average office building uses from 27 to 45 gallons per day per person. Hospital uses, as might be expected, are very much greater. The daily rate runs from 135 to 350 gallons per day per patient. Hotels, growing in number throughout the country, like hospitals, use huge quantities, running at the rate of 300 to 525 gallons per day per guest room.

It was represented to the committee that while a few decades ago a per capita supply of 100 gallons of water per day was considered sufficient for all human needs, that amount of water would not begin to meet requirements at the present time.

In the case of many municipalities the per capita use now is more than 200 gallons per day, thus illustrating the widespread basic need for research of the character provided in this bill.

REPORTS

The reports of the Department of the Interior, the Department of Defense, the Bureau of the Budget, the General Accounting Office, Department of Commerce, and the Department of Agriculture are hereinbelow set forth in full and made a part of this report.

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington 25, D. C., March 14, 1951.

Hon. JOSEPH C. O'MAHONEY,
Chairman, Committee on Interior and Insular Affairs,
United States Senate, Washington 25, D. C.

MY DEAR SENATOR O'MAHONEY: I am glad to comply with your request for an expression of the views of this Department on the bill (S. 5) to provide for research into and demonstration of practical means for the economical production, from sea or other saline waters, or from the atmosphere (including cloud formations), of water suitable for agricultural, industrial, municipal, and other beneficial consumptive uses, and for other purposes.

This bill is based upon several previous bills and amendments thereto. These include S. 1300 and H. R. 3123, Eighty-first Congress, which you and Congressman McKinnon introduced, the amendments to S. 1300 proposed on January 5, 1950, by Senator Downey for himself and for you and Senator McFarland, and the amendments recommended by this Department in its reports of July 7, 1949, April 12, 1950, and June 23, 1950, to your committee and in its report of April 12, 1950, to the House Committee on Public Lands. Reference is invited to those reports for certain details not herein discussed.

Enactment of S. 5 would authorize this Department to engage in necessary research to develop economically feasible means of producing from saline waters directly or from the atmosphere water which is suitable for beneficial consumptive use.

Water shortages are acute throughout many areas of the West today, where many thousands of acres of irrigated land are being kept in production only through serious overpumping of the existing ground water. Pumping from ground water for irrigation in some of the most highly productive areas in California, Arizona, and New Mexico during the past few years has been at rates far exceeding the safe yields as estimated by the United States Geological Survey.

Thousands of acres of fertile western soil await only irrigation water to be transformed into highly productive agricultural lands. With ample water for these lands, opportunities would be presented for expansion of our traditional American farm family way of life, and production of crops to feed and clothe our growing population would be greatly increased.

The fears of drought with its devastation of farm capital and income and its repercussions in commerce and taxation could be ameliorated, and perhaps removed all over the United States with discovery of successful ways to obtain precipitation when and where it is needed.

Rapid increases in population in the Los Angeles, San Diego, and San Francisco-Oakland metropolitan areas of California, during the 1940's and prospective increases there during the 1950's require an ever-continuing search for water. If the present emergency continues for long, the need for additional domestic and industrial water supplies in these and some of the other western cities may well become immediate and pressing.

Many eastern cities, including New York City, Norfolk, Baltimore, Philadelphia, St. Petersburg, Tampa, Mobile, and New Orleans, as well as midwestern and western cities, are vulnerable to droughts; any sudden increase in the population or industry, such as that which would result from defense preparations or war, would cause serious water shortages in many areas.

Many areas throughout the Western States because of soil characteristics have water which is too salty, either originally or because of use and reuse, to be used for irrigation or for industrial and even domestic purposes. Such saltiness is minor compared with the concentrations of ocean water. Such problems can at times be corrected by dilution of the water, or by leaching of soils. But to do so requires an abundance of fresh water generally not available for such purposes.

Man's search for water is the history of the world. The Bible is full of the importance of water to the tribes of Israel. Egypt rose and fell on the flow of the Nile. The Great Plains area of the United States rose to a peak, then came a disastrous slump from lack of water. Man has relied upon wells and the wells dried up; he has tried rivers, and the rivers dried up. Lakes and springs come and go with weather conditions. Few people realize the importance of water in their everyday lives. Water appears to be but an accomplished fact to the average person. But it becomes a fact only as the result of work, research, and vision.

The bill before you is a step forward in man's search. It is a visionary step.

The benefits to millions of our citizens that would follow successful development of economically feasible means of producing, from the oceans and other saline waters, water of quality suitable for beneficial consumptive use would be incalculable. The large-scale purification of the salt water of oceans either directly in conversion plants or by inducing precipitation of the moisture that nature herself has evaporated from the seas and transported inland is an opportunity that challenges not only the imagination, but the scientific resources of the Nation as well. Frontiers would be opened for development throughout the United States.

Converting salt water to fresh water is an everyday occurrence. Any schoolboy can do it with a teakettle. The problem is how to do it on a large scale at reasonable cost. Already we know that by compression-distillation methods fresh water can be and is being produced for a cost of near $180 per acre-foot. The limiting factor is energy cost. Perhaps use of solar energy is the answer. Numerous other methods have been and should be studied. Some already give promise of water at a reasonable price.

Evidence is also piling up that points to the conclusion that it is possible, under certain conditions not completely defined as yet, to cause some rainfall or snowfall artificially. However, the purpose of governmental research to date has been confined almost entirely to the study of cloud modification. Except for very meager studies by private firms, practical rain making to increase water supplies has not been an objective of research. I say this notwithstanding the fact that very large segments of our Western States are now undergoing commercial cloud-seeding operations based on very scanty knowledge of the consequences.

From present indications, it appears that the cost of producing rain or snow artificially may be remarkably low once the research and experimental work has been completed. It appears possible that the winter snow pack in certain mountainous areas might be increased in this way. Thus the total quantity of water available for irrigation, municipal water supply and power production would also be increased. Much basic and applied research and field demonstration, however, will be needed before it can be said with complete certainty on what scale such operations are practicable and what the cost of the resulting product will be.

In addition to the direct benefits that might accrue from increasing the water supply available for beneficial consumptive use, the studies incident thereto may well lead to knowledge which will be useful in controlling or ameliorating air pollution—a serious problem in some areas. The increased runoff from the artificially produced rain or snow may, moreover, require changes in plans for future water-use projects and even in designs of dams and other works. If this additional water is to become available, its amount and location should be determined at the earliest possible date so as to avoid costly alterations of structures now being planned and designed by the Bureau of Reclamation and other Federal and private organizations. It is possible that some modification of existing structures may also be necessary.

The Weather Bureau of the Department of Commerce has for many years engaged in the measurement of atmospheric phenomena, the collection and analysis of precipitation records, and recently in the evaluation of techniques that have been suggested for producing precipitation artificially. The assistance of that agency and of all other organizations which have performed or are conducting research in this field will be sought.

I recommend the deletion of the word "transporting" in line 9, page 2, of the bill, and the word "transportation" in line 13, same page.

The committee may wish to consider adding to paragraph (g) of section 2 (p. 4, line 9) a proviso along the following lines:

"*Provided*, That prior to conducting any operations in the air the Civil Aeronautics Administration shall be consulted and no such operation which, in the judgment of the Administration, will constitute a hazard to the safety of air traffic within a described area and at a specified time if conducted at a proposed place and time shall be conducted at that place and time."

Your committee may also wish to add a new section between the present sections 2 and 3 reading as follows:

"The Secretary shall, with respect to the development of techniques for the production of water from the atmosphere, cooperate with the Secretary of Commerce to assure that the facilities and experience of the Department of Commerce are fully utilized. Research undertaken by the Secretary under the authority contained in this Act shall be coordinated or conducted jointly with the Department of Defense to the greatest practicable extent compatible with military

and security limitations, to the end that research and developments under this Act which are primarily of a civil nature will contribute to the defense of the Nation and that research and developments in the same field which are primarily of a military nature and are conducted by the Department of Defense will be made available to advance the purposes of this Act and to strengthen the civil economy of the Nation."

We were advised by letter dated March 20, 1950, from the Acting Director of the Bureau of the Budget as follows:

"I am authorized to inform you that the President desires to have the Department of the Interior take the leadership in necessary research, experimentation, and demonstration designed to develop economic means of producing from sea water or other saline waters, water which is suitable for agricultural, industrial, municipal water supply, and other beneficial consumptive uses.

"The President agrees that statutory authority for the necessary work should be sought and requests you to take the lead on behalf of the administration in recommending early enactment by the Congress of S. 1300 with certain amendments * * *."

All of the amendments thereafter suggested were recommended by us to your committee in connection with its consideration of S. 1300, Eighty-first Congress, to which reference has already been made, and are incorporated in the text of S. 5.

I am advised by the Bureau of the Budget that there is no objection to transmission of this report to the Congress and that enactment of the proposed legislation would be in accord with the program of the President.

Sincerely yours,

OSCAR L. CHAPMAN,
Secretary of the Interior.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington 25, D. C., March 16, 1951.

Hon. JOSEPH C. O'MAHONEY,
Chairman, Senate Committee on Interior and Insular Affairs,
Senate Office Building, Washington, D. C.

MY DEAR SENATOR O'MAHONEY: This is in reply to your request of January 11, 1951, for the views of the Bureau of the Budget on S. 5, a bill to provide for the extraction of potable water from sea water and other saline sources, and in further response to a letter of February 26, 1951, from Mr. Mills Astin, chief clerk of your committee, in which he asked that we consider S. 5 in relation to two other bills, S. 222 and S. 798, which would provide for the development and regulation of methods of weather modification and control, and of artificially inducing rainfall, respectively.

In his 1951 budget message, the President said, "Experience in recent years has shown that it may not be possible to meet the shortages of water, which are a threat in some areas, through our extensive water-resources program. I recommend, therefore, that the Congress enact legislation authorizing the initiation of research to find means of transforming salt water into fresh water in large volumes at economic costs." As there are no technical obstacles in producing fresh water from the sea and other saline sources such experimentation should continue, with particular attention to the whole matter of the economic feasibility of the project. Accordingly, it is the view of the Bureau of the Budget that authority should be provided to permit research into methods of extracting potable water from saline sources more economically than is possible under present processes.

On the other aspects of these bills, particularly those relating to the artificial induction of rainfall and weather modification and control, the picture is by no means as clear. The principal difficulty, as we understand it, appears to be that the physical processes by which rain is formed and precipitated are not yet understood. Some of the foremost scientists in this field doubt whether there is sufficient experimental evidence to prove that precipitation can be successfully induced artificially. In our present state of imperfect knowledge the difficulties of "controlling" or "modifying" the weather would seem to be so great that any Federal program should be limited to research and the evaluation of existing knowledge and data. At this time, therefore, it would seem to us unwise, if not impossible, to attempt to settle the jurisdictional questions which the three bills raise. The Departments of the Interior, Agriculture, and Commerce all have responsibilities and programs which may be deeply affected by further develop-

ments in weather control and modification. For these reasons the Bureau has indicated that presentation to the committee of their views by all three departments and any other interested agencies would be without objection from this office.

In the light of information obtained in recent weeks, we feel that it would be appropriate for the several Federal agencies concerned to continue whatever work they can under existing authorities and funds made available under those authorities. We are of the opinion that such further work as can be justified at this time can be carried on under the provisions of S. 5 as suggested for amendment by the Department of the Interior in its report. The authorities of that bill will permit full interdepartmental collaboration.

Finally, it would seem to this office that further information on attempts to alter weather conditions should be collected from whatever sources are available throughout the country and that such information should be presented to the Congress before legislative authorizations broader than those contemplated in S. 5 are enacted into law.

Sincerely yours,

F. J. LAWTON, *Director.*

DEPARTMENT OF THE ARMY,
Washington, D. C., May 28, 1951.

Hon. EDWIN C. JOHNSON,
Chairman, Committee on Interstate and Foreign Commerce,
United States Senate.

DEAR SENATOR JOHNSON: Reference is made to your recent request to the Secretary of Defense for the views of the Department of Defense with respect to S. 222, a bill to provide for the development and regulation of methods of weather modification and control. Although your committee has not requested an expression of the views of the Department of Defense with respect to S. 5, a bill to provide for research into and demonstration of practical means for the economical production, from sea or other saline waters, or from the atmosphere (including cloud formations), of water suitable for agricultural, industrial, municipal, and other beneficial consumptive uses, and for other purposes, and S. 798, a bill to authorize the Secretary of Agriculture to conduct research and experiments with respect to methods of controlling and producing precipitation in moisture-deficient areas, for the convenience of the subcommittee which is considering those bills together with S. 222, and at the suggestion of the Secretary of Defense, the views of the Department on all three bills are incorporated in this report. The Secretary of Defense has delegated to this Department the responsibility for expressing the views of the Department of Defense on the mentioned bills.

The Department of the Army, on behalf of the Department of Defense, favors the enactment of S. 5, subject to the comments and recommendations set forth below, and is opposed to the enactment of S. 798 and S. 222 in their present form.

S. 222 sets out findings intended to establish the importance of the matter of weather modification and control; the proposed policy of the Congress, among other things, to regulate and supervise experiments and operations designed to modify and control weather; and the stated purpose of the bill, which is to effectuate the policies and establish certain major programs. The bill also provides for the establishment of a Control Commission much along the same lines as the Atomic Energy Commission, with advisory and liaison committees.

S. 5, with one exception, is substantially the same as S. 1300, Eighty-first Congress, and in general sets forth the policy of the Congress to provide for the development of economically feasible means of producing from sea water, other saline waters or from the atmosphere, water of quality suitable for agricultural, industrial, municipal, and other beneficial consumptive uses. To this end, the Secretary of the Interior is authorized to conduct research and development work, to acquire patents, inventions, and other property, to cooperate with other governmental departments, agencies, or instrumentalities, and to request other Federal departments, agencies, and instrumentalities to provide assistance. Certain authority is also granted to the Secretary of the Interior to dispose of water and other products produced as a result of his operations under the bill. Authorization for appropriations of up to $25 million is contained in the bill, as well as certain provisions for indemnification, periodic reports to the Congress, and issuance of rules and regulations.

S. 798 directs the Secretary of Agriculture to conduct research and experiments and to take such further action as may be necessary to perfect methods of causing

rain to fall in deficient areas. Other Federal departments are directed to make their records and data available to the Secretary of Agriculture. The bill also contains an authorization for appropriations.

The armed services have been engaged in basic studies of weather modification which have led to certain techniques now being tested. Experiments and tests to date have had some possible significance but their results cannot be considered conclusive as yet. The results to date indicate that under favorable conditions some local changes can be produced by artificial means. This is generally agreed upon by most independent experts. There is, however, considerable controversy as to whether cloud modification can effect major weather changes; for instance, there appears to be no hope at the present time to break a genuine drought by this means. The evidence that some changes can be induced is sufficiently strong, however, to make it desirable to explore further possible tactical and strategic implications. Current and prospective tests by the services also have possible military applications, the nature of which necessarily constitute classified information at this time.

There is a considerable element of doubt concerning the validity of results to the present because of cloud-seeding activities of others, which may have had some effect on the tests conducted by the Armed Services. It is generally agreed that methodical, systematic, and coordinated research should be encouraged. Large operations by irresponsible persons could seriously upset research activities of serious students in this field. Legislation which would protect the validity of experiments by providing for coordination of effort and, at the same time, not hamper vigorous prosecution of valid research is desirable. Such legislation should also provide means for protecting the public against the great danger of victimization, especially farmers and others who need water from time to time. The protective mechanism which is required should, however, be commensurate with the needs and at present it appears that this mechanism should be relatively simple and easily enforceable.

It thus appears that there is no basic difference of opinion between the Armed Services and the author of S. 222 as to the necessity of control of experiments in weather modification and control; the services feel, however, that the extent of valid scientific knowledge on the subject is not yet sufficient to justify a large and expensive control organization or the degree of regulation contemplated by the bill. It is believed that the mechanism to accomplish the necessary control could be established within the framework of presently existing Government agencies. Emphasis at this time should be on research with only so much control as may be necessary to insure coordinated effort and to present indiscriminate and irresponsible attempts at cloud modification. This control could be provided for by a simple bill which would vest in an existing agency, such as the quasi-judicial Interstate Commerce Commission, authority to issue regulations setting forth terms and conditions on which all seeding may be conducted, including a requirement that all persons, firms, or corporations engaged in the seeding of clouds shall furnish specified information and findings to the Weather Bureau.

Such a bill should also give to all Government agencies engaged in research in this field authority to indemnify their contractors against liability for all damage directly resulting from their research. Appropriate language for such a section is contained in section 10 of S. 222, which provides generally for broad assumption by the Government of liability for damages resulting from the performance of contracts relating to weather modification or control. This section is broader than the provisions of section 5 of S. 323 (a bill to facilitate performance of research and development work by and on behalf of the military departments) in that it provides for sole responsibility by the Government for damages, and that no cause of action with respect to any such claim for damages may be maintained against the contractor but shall be solely by suit against the United States in the Court of Claims. The provisions of section 10 are not objectionable, even as broad as they are, except the clause set forth on lines 2 and 3 on page 21, "whether due to the negligence of the contractor or otherwise." It is believed that the Government should not be an insurer of a contractor so as to protect him on account of his own negligent acts. The quoted clause should be stricken out from the section. In addition, there should be inserted in whatever section is equivalent to section 10 a provision authorizing settlement of claims by the head of the contracting agency and in such case, the second proviso of section 5 of S. 323 should also be included in the bill.

It is believed that a bill containing the foregoing provisions would be sufficient to meet present needs. Interested Government agencies would undoubtedly form a coordinating committee under the Interdepartmental Committee on Research and Development, or some other existing agency, who would advise the

regulatory body, coordinate research activities of Government agencies, and review all the developments and recommend to the regulatory agency additional legislation as required.

The Federal Trade Commission under its authority to prevent "unfair or deceptive acts or practices in commerce" could be requested to exercise its authority with respect to false claims made by professional "rainmakers." This would prevent, to a great measure, the victimization of farmers and others who need water from time to time and who might be deceived by extravagant or false claims.

With respect to S. 5, which is described above, it is believed that express authorization to conduct research in cloud modification is not necessary for any Federal agency having an interest in the field. If the authority is not actually needed, it should be deleted from S. 5 because it might cast doubt on the authority of other agencies to engage in similar activities.

S. 798 is based upon the premise that rain can be made where and when wanted. To this extent the bill is misleading. Furthermore, this bill would accomplish very little in that adequate authority already exists in all agencies having interest in the field for the conduct of research in cloud modification. The provisions of section 2 (a) which requires all agencies to make all data relating to cloud modification available to the Department of Agriculture might be seriously detrimental to the national security because it might require the furnishing of such data even though classified for military security reasons.

The Department of the Army, in behalf of the Department of Defense, recommends that S. 5 be modified in accordance with the foregoing views and, as thus modified, recommends its enactment. The Department does not recommend enactment of S. 798 or S. 222.

The fiscal effect of S. 222 is unknown to the Department of Defense. The fiscal effect of S. 5 is apparent from section 8 thereof, which authorizes appropriations not to exceed $25 million. The fiscal effect of S. 798 is also unknown to the Department of Defense.

This report has been coordinated among the departments and boards of the Department of Defense in accordance with procedures prescribed by the Secretary of Defense.

The Bureau of the Budget advises that there is no objection to the submission of this report.

Sincerely yours,

FRANK PACE, JR.,
Secretary of the Army.

DEPARTMENT OF AGRICULTURE,
Washington 25, D. C., March 13, 1951.

Mr. MILLS ASTIN,
Chief Clerk, Committee on Interior and Insular Affairs,
United States Senate.

DEAR MR. ASTIN: This is in reply to your letter of February 27 respecting requests for funds and authorizations enabling this Department to carry on activities in the artificial induction of rainfall, weather control, and the extraction of potable waters from sources including sea water.

This Department has not requested appropriations specifically earmarked for use in any of these kinds of activities. The President's budget for fiscal year 1950 and fiscal year 1951 did carry an item of increase for research in forest fire control research, part of which would have been used to experiment with methods of cloud dissipation to reduce the number of so-called "dry-lightning" storms which are the cause of so many forest fires in the Northwest. However, funds for these increased activities were not appropriated.

There is no legislation which specifically authorizes this Department to undertake research along any of the lines mentioned in your letter. We consider, however, that the McSweeny-McNary Act (Public Law 466, 70th Cong., approved May 22, 1928) which authorizes us to carry on forest-fire control research provides authorization for us to undertake weather-control experiments which might disclose means of reducing forest fires.

We have undertaken no work along the lines mentioned in your letter except a very small amount of exploratory work on cloud dissipation to minimize lightning, as a basis for judging whether further activities of this kind might be justified.

Sincerely yours,

K. T. HUTCHINSON,
Assistant Secretary.

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington 25, D. C., March 14, 1951.

Hon. JOSEPH C. O'MAHONEY,
Chairman, Committee on Interior and Insular Affairs,
United States Senate.

MY DEAR MR. CHAIRMAN: Reference is made to letter dated February 26, 1951, from the chief clerk of your committee, with respect to S. 5, Eighty-second Congress, entitled "A bill to provide for research into and demonstration of practical means for the economical production from sea or other saline waters, or from the atmosphere (including cloud formations), of water suitable for agricultural, industrial, municipal, and other beneficial consumptive uses, and for other purposes"; S. 222, Eighty-second Congress, entitled "A bill to provide for the development and regulation of methods of weather modification and control"; and S. 798, Eighty-second Congress, entitled "A bill to authorize the Secretary of Agriculture to conduct research and experiments with respect to methods of controlling and producing precipitation in moisture-deficient areas." The letter states that your committee is considering S. 5, that S. 222 is being considered by the Committee on Interstate and Foreign Commerce, and that S. 798 is being considered by the Agriculture and Forestry Committee, but that hearings on the bills will be held jointly. The letter requests a copy of a report said to have been requested on S. 222 and invites this Office to have representatives at the forthcoming hearings, to observe and to testify, if desired.

The bill pending before your committee, S. 5, would confer upon the Secretary of the Interior authority to take such action as is set out therein to accomplish the purposes indicated in its title. This Office has no information as to the need for or desirability of the enactment of this bill and makes no recommendation with respect thereto. No request has been received here for reports on S. 222 or S. 798. However, under date of January 2, 1951, this Office made a report to the chairman of the Senate Committee on Interstate and Foreign Commerce on S. 4236, Eighty-first Congress, which bill was practically identical to the pending bill, S. 222. Since this Office had no information concerning the purpose and need of the proposed legislation other than that contained in a statement by Senator Anderson and in pertinent articles by two scientists printed at pages 16475–16476 of the Congressional Record for December 8, 1950, no recommendation was made with respect to the enactment of S. 4236, Eighty-first Congress. Similarly, this Office has no special information with respect to any of the three bills here under consideration.

The suggestion contained in the letter from your committee that this Office might desire to have representatives at the hearings is appreciated but, since as stated above, this Office has no information which it is believed would be helpful to the committees having the said bills under consideration, such representatives will not be in attendance unless specifically requested.

Sincerely yours,

FRANK L. YATES,
Acting Comptroller General of the United States.

DEPARTMENT OF COMMERCE,
Washington, March 14, 1951.

Hon. EDWIN C. JOHNSON,
Chairman, Committee on Interstate and Foreign Commerce,
United States Senate, Washington, D. C.

DEAR MR. CHAIRMAN: This letter is in further reply to your request for our views with respect to S. 5, S. 222, and S. 798, bills providing authority for Government assistance to the development of processes for producing water suitable for agriculture, industrial, and other beneficial uses from saline waters and for research and regulation of weather modification activities.

There is attached a statement of our views concerning these bills.

The Bureau of the Budget advises us that there would be no objection to the submission of these views. If we can be of further assistance in this matter, please call on us.

Sincerely yours,

THOMAS W. S. DAVIS,
Acting Secretary of Commerce.

VIEWS OF THE DEPARTMENT OF COMMERCE WITH RESPECT TO S. 5 AND RELATED BILLS TO ASSIST IN THE DEVELOPMENT OF PROCESSES TO INCREASE THE AVAILABILITY OF USABLE WATER FROM SALINE WATERS AND THE ATMOSPHERE, AND FOR OTHER PURPOSES

S. 5 would authorize the Secretary of Interior to conduct research on the production from saline waters of water suitable for agriculture, industry, municipal and other beneficial uses, and on the production of water from the atmosphere.

S. 222 would establish a Weather Control Commission with broad powers to conduct research in the field of weather control and rain making and to license others to perform these functions.

We believe generally that Government research and development in the field should proceed and we therefore favor the general objectives of these bills.

In drafting S. 5, the importance of the economic feasibility of processes developed for obtaining usable water from saline waters is stressed. We share this view and believe this to be the most important aspect of this devel pment. For this reason we recommend that consideration be given to imposing a safeguard in the bill to provide that, to the fullest extent practicable, cost studies of any proposed method be made before a plant for the demonstration of that control is erected.

We also recommend that consideration be given to the fullest utilization of water resources presently available. Fresh water in vast quantities is discharged into the oceans from the rivers of the United States. Utilization of this river water, if possible, would, in large measure, eliminate the ocean-side costs of obtaining additional salt-free water, while transportation costs would, depending on the area, remain the same as for processed saline waters. Consideration should also be given to the increased use of sewage effluent for agricultural purposes, which would permit greater utilization of natural water resources for domestic and other uses. It is not clear that research on these two aspects of the problem would be authorized by S. 5, and the legislative history of this bill or the language therein should, in our opinion, be written to authorize their inclusion.

With respect to controlled production of water from the atmosphere, or rainmaking, we enter the area of speculation and uncertainty. Acting under authority of Public Law 691, Seventy-ninth Congress (49 U. S. C. 603, 60 Stat. 944), and Public Law 657, Eightieth Congress (62 Stat. 470) the Weather Bureau has conducted extensive research in weather control and rain making. This research and experimentation does not support the conclusion that significant amounts of rainfall can be artificially induced in addition to that which would have occurred naturally in the locality. We had contemplated that this research would be continued until the fullest possible knowledge of the subject is gained.

If we assume the development of artificial rain making, we are of the opinion that the processes developed will effect climatic changes in the area directly controlled and elsewhere. Certainly the Weather Bureau, and the Department of Commerce generally, would have a most direct and immediate interest and responsibility in these effects. In the light of this interest and responsibility and in the light of the research already carried on by the Department in the field, which has resulted in considerable data (see The Thunderstorm, etc., 1949, available at Superintendent of Documents, U. S. Government Printing Office), we believe that primary responsibility for furthering weather control should be continued in the Department of Commerce.

We recognize the potential danger of unrestricted experimentation in the control of weather, and of restrictions which are not uniform, and therefore recommend that, in addition to conducting such experimentation, the agency should be empowered to license activities in the field giving consideration to the exclusion by class from the requirement of licenses, such localized activities as fog dispersal at airports, frost prevention in orchards, etc. We would also favor the enactment of provisions safeguarding contractors hired by the Government to carry out experimentation in this field from liability arising out of their activities. We believe that the state of development in this field does not warrant further Government action.

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